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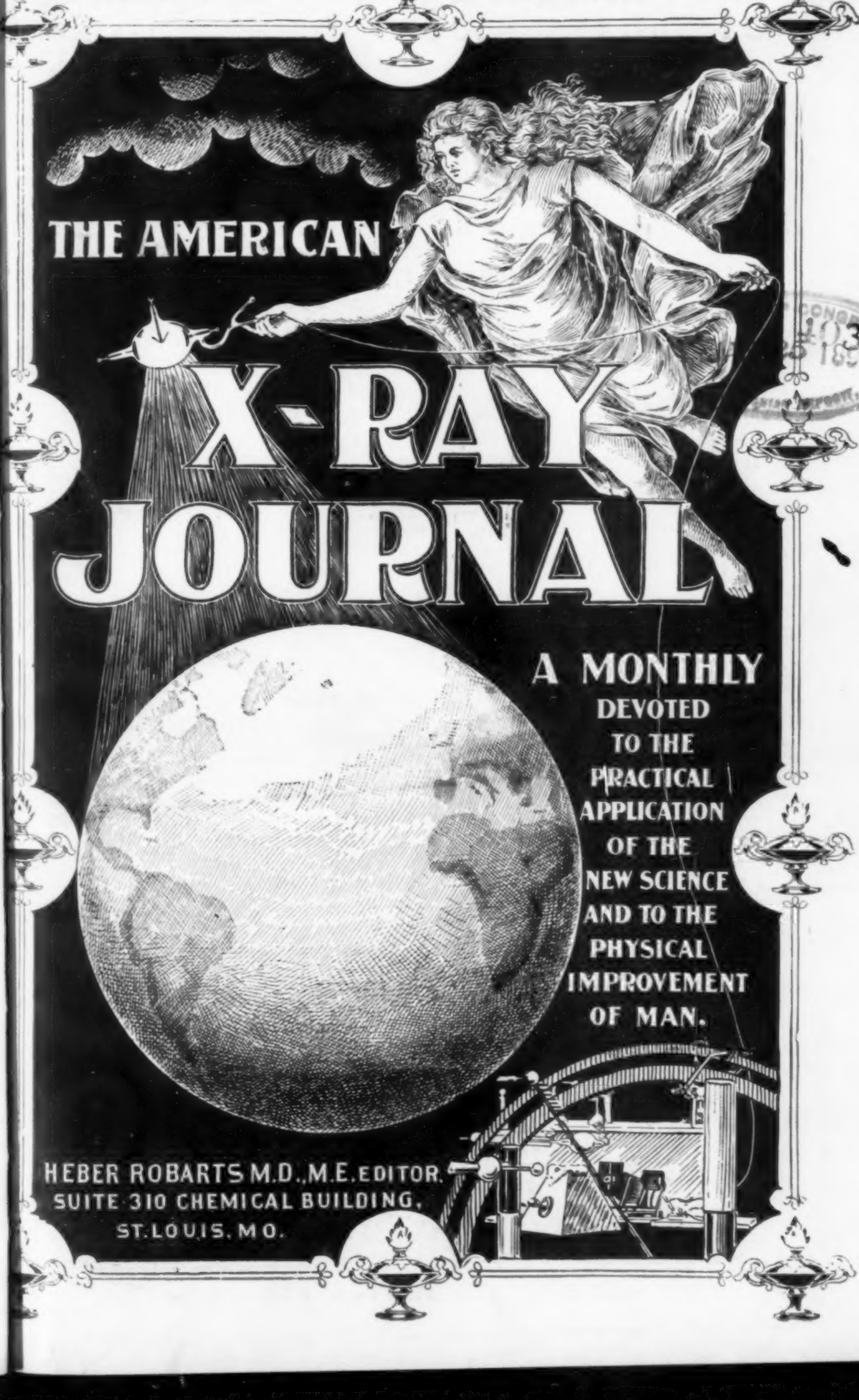

THE AMERICAN X-RAY JOURNAL

A MONTHLY DEVOTED TO THE PRACTICAL APPLICATION OF THE NEW SCIENCE AND TO THE PHYSICAL IMPROVEMENT OF MAN.

HEBER ROBARTS M.D., M.E. EDITOR.
SUITE 310 CHEMICAL BUILDING,
ST. LOUIS, MO.


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TABLETS.
EFFECTIVE, CONVENIENT AND COMPACT FORM OF TONGALINE LIQUID.
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QUININE TABLETS.
ANTI-MALARIAL, ANTI-PERIODIC.
MUCH DISEASE ARISES FROM DEFECTIVE ELIMINATION
CORRECT THE DIFFICULTY BY THE USE OF TONGALINE, THE GREAT ELIMINATOR, AND RESTORE NORMAL CONDITIONS.

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Devoted to Practical X-Ray Work and Allied Arts and Sciences.

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ROENTGEN LIGHT.

Accepting from the beginning the statement made by Crookes many years ago that the cathode stream was composed of material particles it seemed probable when Roentgen's discovery was announced that the wave length of this new form of radiation would depend upon the temperature to which the particles of the cathode stream were raised by their impact upon the target. To test this a tube was constructed in 1896 in which the metal target was hollow and could be cooled to any desired temperature. With tubes of this kind many experiments have been made, a few of the results which seemed likely to be of interest being published from time to time as a series of short notes in the *Electrical Review* during 1897-8.

As they are scatttered over a considerable period owing to the infrequent intervals available for preparing them, this summary of a few of the observations is now made.

The cause of Roentgen light is a high temperature of the originating particles.

The wave length of the radiation depends upon the temperature of these particles.

Their temperature is due to several conditions.

First—On the velocity with which they strike the target; the higher the velocity the greater their temperature.

Second—On the angle at which they strike; the greater the angle the higher their temperature: a glancing blow not stopping the particles as suddenly, their temperature never reaches a maximum.

Third—On the nature of the target; the denser the target the higher their temperature, because the denser metals stop them most suddenly.

Fourth—On the temperature of the target; the colder the target the lower their temperature—a target cooled below zero yields less light than when the temperature is several hundred degrees higher. On the other hand many observations indicate that a temperature suffi-

cient to materially soften the surface of the target diminishes the efficiency of the tube.

The velocity with which the particles strike the target depends upon several conditions.

First—On the electromotive force; the higher this is the greater their velocity.

Second—On the distance of the target; the greater the distance the less violent the impact.

Third—On obstructions on the way. These arise from various causes—the degree of the vacuum; the form of the tube; the amount of harmony between the vibrations of the exciting current and the tube. One can get a good idea of what is going on in a tube when harmony is absent by looking out of a rear window of his town house during a wild snow storm and watching in the narrow alley with its irregular sides the tempestuous rush of the snow as it is driven by the constantly changing reflections of the wind.

Fourth—On the weight of the particles; a higher electromotive force is required to deliver mercury particles at the target with a given velocity than those of aluminum and oxygen.

The amount of light depends upon the quantity of energy utilized at the target; with a given velocity of impact the greater the amperage the more the light.

Definition depends on several conditions—

First—On the size of the radiant area on the target; the smaller this is the better the definition, therefore the target should not be at the theoretical but at the real focus of the cathode discharge, the distance of which from the cathode depends upon the degree of repulsion between the particles forming the discharge and is a result of the intensity of their charges. For the degree of exhaustion generally employed the focus is twice the length of the radius of the cathode curvature or double the theoretical distance.

Second—On the steadiness of the radiant area: due to harmony and right proportion between the size of the cathode and the surges.

Third—On eliminating other light sources, such as the second impact or that of rebound; the anode rush; the secondary source.

Fourth—On the proper form of the tube.

Fifth—On the use of the diaphragm.

Sixth—On shielding the object to be photographed from aerial reflections in the room by using opaque metal plates closed as far as possible so that no Roentgen radiation can reach the object except in straight lines from the target.

Seventh—On maintaining a considerable distance between the tube and the object, thus producing shadows of nearly normal size, a matter of importance in medical diagnosis.

Ninth—On the quality of light: it is unwise to flood the tissues with light of any wave length expecting thereby to bring out more detail. One of the reasons why a photograph often shows more detail than the fluoroscope is the smaller amount of light needed to affect the plate than to give clear images on the screen.

The Form of Tubes.—A tube should be of sufficient length to admit of the use of a high electromotive force. The cathode should be in proportion to the surges; largest for large condensers, smaller for Tesla coils, where the amperage of each surge may be less on account of the rapidity with which they come. There should be a simple method of lowering the vacuum to enable a large amperage to be sent through the tube for a long time without need of re-pumping.

The Residual Gases.—The atomic

weights of the cathode and the residual gases should be near each other.

The Target.—This should be so constructed as to enable a large amperage to be used without injury and so arranged that its temperature may be varied according to the kind of radiation desired, for it should be remembered that in the same tube, by changing the temperature of the target and the velocity of impact, we can make light of any wave length from the shortest Roentgen down to, including and below that of ordinary light.

Distance of the Cathode.—This should be less for small than for large generators. The cathode being a rapid firing gun should be placed in the most efficient position for regular and rapid loading, being shielded from the anode rush. The walls of the tube should be of such curvature as to prevent the return stream from causing collisions with the normal cathode discharge as well as to ensure a regular circulation. The target should be in a line between the cathode and anode or the cathode discharge will not strike with efficiency. When the anode is behind the cathode the concave surface of the cathode gives off so little force that the target is no longer an available source of Roentgen radiation with ordinary generators, while a diffuse stream of particles rises from the convex side and by their impact upon the glass walls give rise to a broad area of Roentgen light. The cathode discharge is therefore not independent of the position of the anode.

Generators.—There are no efficient ones outside the laboratories of the great electricians like Tesla and Thomson. Large static machines while very satisfactory for experimental work because they can be run for days without attention, yielding a constant amount of current, have so little amperage that they require the patient to be placed within a few feet of the tube. Ordinary induction coils are irregular in action while if made to give high electromotive force the discharges are slow and the amount of force delivered at the target is too small.

High frequency coils though condemned by eminent foreign authority on account of the imperfect definition from tubes excited by them, are our main hope for the future. This form of generator whose development we owe to Tesla can deliver a large amount of force at the target, while by keeping this from melting as well as by throwing the second light source out of the field, an astonishing amount of light can be obtained with good definition. No one, however, seems able to make them work with regularity, the interrupter being a constant cause of trouble. Until Tesla is willing to leave other work in order to furnish the profession with a suitable break we shall have but imperfect ideas of the value of Roentgen's discovery for medical diagnosis. WILLIAM ROLLINS.

WITHIN the past few years there has been a remarkable increase in the use of the static machine, and one of the foremost in advocating and popularizing its use in the profession has been Dr. S. H. Monell. He has also forced the recognition of the static machine as a preferable means for producing the x-ray, and that against determined opposition. A visit to his office gives no indication of ostentation or exaggeration, but convinces one that he is moderate in his claims, and has accomplished what he has by hard work and unremitting attention.—*Cleveland Medical Gazette.*

A GERMAN army surgeon states that in a large number of "sprains" of the ankle joints the Roentgen ray showed that in the majority of cases there was actually either fracture or dislocation of some one or more of the small bones. The treatment should be fixation, in order to prevent false joints, exostoses, etc., leaving permanent impairment of functions. —*Medical Times*, N. Y.

ROENTGEN RAY DERMATITIS.

BY ELIHU THOMSON.

I notice that in the November number of The X-Ray Journal immediately following my article on X-Ray Burns, there is a paper by Dr. Chas. Lester Leonard practically on the same subject.

He endeavors to show that electrostatic charges or effects are the true cause of the dermatitis and not Roentgen rays. In doing this, however, he misinterprets very ordinary electrical phenomena and conditions. Had he interpreted correctly the results he alludes to, his conclusions must have been the opposite of those which he takes so much pains to maintain.

He says: "It is a physical fact that high potential currents produce static fields of electricity around their paths." Also—"High potential currents have a more marked effect on tissue than any other form of electricity and are capable of doing more injury."

Both of these statements are based on a misconception. All electric currents in the same conductor are alike if of the same frequency and wave form. Properly speaking there are no high potential currents at all. Static fields of electricity are produced not by current, but by electric pressures excited upon insulating media. A current attends equalization or neutralization through conductors. Injury by electric current acting upon tissue is due, not to the potential, but to the current flowing. If a living organism can not stand more than a certain number of milli-amperes without being destroyed or devitalized, then it matters not if the source of such current be of high or low potential. It is the current which alone kills. It so happens that most tissues have so high a resistance as to require a considerable potential to force the current to flow, but if, for example, 1,000 volts exist in one case and 10,000 in another, and the conditions also exist in each case for the passage of only that amount of current which would destroy vitality, the difference of potentials in each instance will not affect the result. A person may indeed be killed by a very low voltage such as 100 volts if an excellent contact with the skin be made, as by the use of large surfaced electrodes of liquid; such as brine.

Abundant experience proves that, regardless of potential, currents of high frequency are almost without physiological action.

I have frequently passed such currents through my body without apparent effect, and in amounts thousands of times in excess of any possible currents due to static fields in the neighborhood of vacuum tubes.

This is significant taken in connection with the fact that just such harmless high frequency currents are often used in exciting Roentgen ray tubes of the double focus type.

Are such double focus tubes as excited by harmless high frequency currents, incapable of producing Roentgen ray dermatitis? Certainly not.

In referring to the discussion of the therapeutic effects by Edward Schiff and Leopold Freund, of Vienna, Dr. Leonard says:

"They found that the most energetic action was exerted by a tube of moderately low vacuum energized by a spark of high electromotive force and amperage, 3½ amp. and 12¾ volts at a distance of about four and one half inches and with a long exposure."

I confess I am at a loss to understand the "3½ amp. and 12¾ volts" as referring to the current and pressure used in working a vacuum tube. The current is absurdly high and the volts more absurdly low. But it is possible that the figures refer to the current and volts of the primary coil of a Ruhmkorff used in the experiments. The statement and

that which follows "11½ volts and 2 amperes" is certainly obscure as it stands.

I make the quotation in which these figures are contained, not so much on account of the irrelevancy of the figures, but because it is stated that the "most energetic action was exerted by a tube of moderately low vacuum". This accords with my experience. Dermatitis *is* more easily produced by the low vacuum tube because a very large proportion of the rays emitted by such a tube are readily absorbed by the skin and flesh, and so do harm.

"What," says Dr. Leonard, "is the reason for the excessive action which they found in a tube of low vacuum," &c.

He answers his own question thus: "It is the higher amperage current which the lower resistance of such a vacuum permits to pass through the secondary circuit, produces a more intense static field around the tube, &c."

Nothing could be farther from the truth. This would be equivalent to saying that if the tube had no resistance the static field around it would be a maximum, which is the reverse of true. As electricians well know it is impossible to establish static fields between bodies joined by a conductor of no resistance or a perfect conductor. Is it possible that Dr. Leonard is getting "magnetic field," which is stronger the stronger the current, mixed up with "static field"?

He says again: "If it is the Roentgen ray *per se* that exerts this therapeutic and destructive action, why is it that they find a high vacuum tube, which we know produces the most intense fluorescent effects and has the greatest penetration or Roentgen value, has the least therapeutic value?'

And in his answer he is equally at fault. He says: "The resistance of the high vacuum tube is too great to permit the flow of a high amperage current through the secondary and it thus prevents the formation of an intense static induction field about the tube." Does not Dr. Leonard realize that an induction coil gives a maximum static field when its terminals are insulated or separated by a very high resistance; and does he not know that connecting the terminals of the coil by a copper wire, in which case the higher amperage exists, is just the way to prevent static field? His misinterpretation is as complete as it could well be.

The true explanation of the action of the high vacuum tube is very simple, namely, it gives off a less proportion of rays of easy absorbability by the skin and tissues and so does less harm.

Schiff and Freund were then quite right in their interpretation of their results as due to certain kinds of Roentgen rays.

I have already in my former article, shown why a screen of aluminum is a protection by its absorbing the harmful rays of easy absorbability, permitting the highly penetrating and harmless rays to pass. Electrically a wire mesh or netting would be about as effective a screen for static field as an unperforated plate, but I venture to predict that the hardy experimenter who uses a perforated screen with a low vacuum tube and long exposure will not escape, although the static effects will have been effectually shielded in such case.

The fact that complete plates used as screens afford protection is certainly, as Dr. Leonard says, "strong evidence that the agent that is at work and is eliminated by their use * * * is the cause of the dermatitis and the source of therapeutic action."

But in inserting with this quoted sentence the words *i. e.* "the static electric current" he spoils the statement as to its truth. In the first place, what, it may be asked, is a "static electric current."? That I am not acquainted with such a thing I must confess.

There are other statements equally cu-

rious to an electrician, equally meaningless, and quite fallacious if a meaning be assumed. Dr. Leonard says, "on the other hand when it (the screen) was omitted the static charge collected in the patient, and a deep necrosis was the result of the devitalization of the tissues."

Does not the doctor know that for a static charge to *collect in a patient* the latter must be pretty well insulated? Does he not know that the surest way to prevent its collection in the patient is to connect the patient to ground? Why not recommend that procedure as a preventative? He is, however, evidently unaware that a collected charge in a patient will reside only on the surface, not alone of the skin but of the clothing where it covers the skin; that it will diffuse itself and be most intense on the projections or extremities. Why then should such a collected charge, if it be assumed to collect, act only where the Roentgen rays are being absorbed? Why should it act *deeply* in any case? Why would it not produce a dermatitis on the ends of the fingers, on the nose and on the feet of the patient, where the static charge, assuming the patient insulated, can most readily collect?

Was there ever a case of such severe dermatitis produced simply by electrifying a person when mounted upon an insulating stool even with the highest static charges? Indeed I have myself while insulated been repeatedly charged for many minutes at a time to potentials such as would be able to cause sparks to leap over ten inches between body and ground, without ever having experienced the least ill effects.

Persons have been known to work day after day in proximity to electrified belts without trouble. The peculiar deep necrosis of the Roentgen ray burn was, I believe, unknown in the absence of the excited Crookes' tube and still always requires for its production such a piece of apparatus.

It is about time that occult and impossible properties of static fields should cease to be invoked to account for account for actions that have been plainly recognized and traced to their origin by suitable crucial experiments.

Let the persistent exponents of the static field mystery try the experiment of using a low or "soft" tube, energized so as to give abundant rays of easy absorbability by the skin, with a very long exposure and with a screen having say a hole of one-half inch diameter in it. Let the screen be grounded, if they please and under the opening let the back of the hand be placed on a finger and kept so that the rays through the opening continually enter the same spot of skin surface during the long exposure. The screen may be made of copper or brass heavy enough to take care of all eletrostatic induction. This it will certainly do in spite of the hole assumed to be made in it and through which the rays, purged of static field effects, may freely pass. It would be interesting to have a report of the conditiou of the spot of skin surface say two weeks after a conscientious trial of this kind was made.

I have tried just such an experiment, as I have before stated in THE AMERICAN X-RAY JOURNAL, but the opening in the screen was oblong and I have now a scar to show where the exposure was made. More than that, two thicknesses of aluminum foil were used over a portion of the spot during exposure and were not sufficient to prevent the dermatitis. Could anything be more convincing as to the fact that static field has nothing to do with the case? What more proof is needed that electricity or electric currents are not involved? On the other hand the *proof is positive that Roentgen rays of such character as to be easily absorbed by the tissues are the true agency in causing the dermatitis.* I was convinced of that by my experiments

made over two years ago. I am pleased to find that Dr. Philip Mills Jones, of the University of California has written several papers putting forward views in substantial accord with my own and I am sure that any competent investigator attacking this question must be drawn to the adoption of these views.

SKIAGRAPHY IN GUNSHOT WOUNDS.

BY DR. GEORGE F. SHEARS.

The following case is presented as illustrating the value of the x-ray in locating foreign bodies imbedded in the tissues.

FIG. 1.

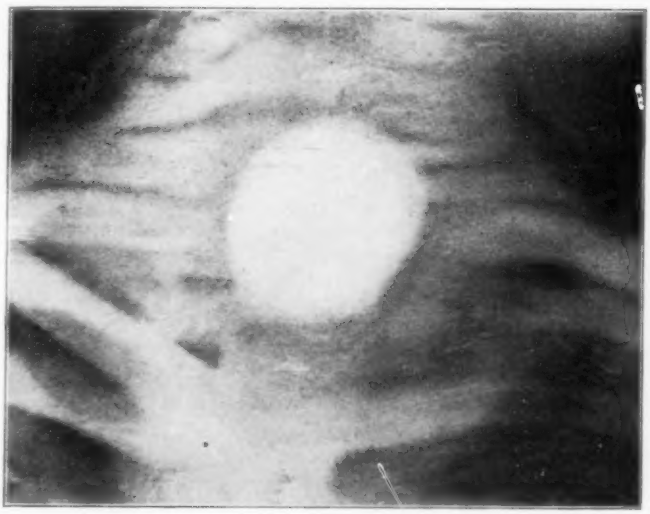

FIG. 2.

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years ago was shot in the neck. The bullet entered the left side about the level of the fourth cerebral vertebra, and on a line dropped perpendicularly from the lobe of the ear.

The line of direction through the tissue, according to the patient as received from the statement of her physicians, was upward and slightly forward. The bullet was probed for but could not be located, and after careful search had been made all attempts to find it were abandoned. It was believed that the bullet was in the deep structures near some of the great arterial trunks. The patient made a good recovery from the injury. Some six months after this she began to complain of neuralgic pains extending up the spine from a point midway between the shoulders to the base of the cranium; accompanying this were symptoms of nervous irritability in other parts of the body. Her eyes troubled her, being the seat of pain, and often it was difficult for her to focus them upon near objects. She applied to several prominent surgeons, who advised her to let the bullet alone as in all probability it was located near the carotid artery, and would not only be difficult to find, but there was considerable risk in making the operation.

She applied to me and was advised to have a skiagraph made of her neck and the bullet accurately located. To this she consented, and the accompanying skiagraphs (Figs. 1 and 2) were made showing the bullet located to the left of the median line on the posterior side of the spine, and lying on the transverse process of the fifth cervical vertebra. An incision was made seven-eights of an inch to the left of the median line on the posterior surface of the neck over the fifth cervical vertebra and continued through the muscular tissue until the bullet was reached, when it was easily extracted.

Two points may be of interest to consider in addition to the locating of the bullet by the x-ray. First, the presence of the nervous symptoms; and second, the course of the bullet. Were the nervous symptoms due to imagination, or did they follow from some injury done by the bullet? So far as can be determined by the location of the bullet they could not be due to its presence. It was imbedded in muscular tissue and could not impinge upon any nerve trunk of importance.

Still its removal, so the patient claims, relieved all except the eye symptoms. In regard to the second point it may be noted by looking at the skiagraph that the bullet is located with the point downward and is below its point of entrance. The bullet itself, you may observe, is slightly flattened upon one side. It is quite possible, therefore, that the bullet may have passed upward, as was believed by the examining surgeons, come in contact with one of the cervical vertebra and been deflected downward. And it may be that to some injury done in its passage, rather than to its pressure, are due the nervous symptoms suffered by the patient.—*The Clinique.*

PRESSURE IN THE INTERIOR OF VACUUM TUBES. Seguy. *L'Eclairage Elec.*, Sept. 17, and *L'Ind. Elec.*, Sept., 25. *Electrical World*, N. Y.—A reprint of an Academy note, in which he enunciates the following law: The internal pressure in an exhausted vessel is neither uniform nor constant in all the parts of the vessel when it is traversed by an electric current. To prove this he experimented with a tube 4 meters long and exhausted to a millionth of an atmosphere; when a current was passed he found that for about half the length of the tube from the cathode end of the vacuum was about the same, but near the anode the pressure had been raised to about a thousandth of an atmosphere.

THE X-RAY IN FORENSIC MEDICINE.*

BY FRANK WARD ROSS, A. M., M. D., PH. D.,
Acting Assistant Surgeon, U. S. A.

My personal experience and observation, from which I have evolved the subject matter of this brief paper, convinces me that the x-ray in forensic medicine is not necessarily a bed of roses. There are many pitfalls and unpleasant experiences, which must be considered and met.

If I can make the way clearer to avoid these dangers, and add to the safeguards and methods to be employed, by those of this distinguished body who may use the x-ray in cases when required to appear in court, and assist them in any way to make their efforts competent, and their evidence safe, I shall have accomplished my mission.

Knowing that it had come to my lot to have a little personal experience in a number of forensic cases, your distinguished Chairman, the Hon. Clark Bell, requested this paper.

I shall be brief and practical. I shall begin by giving hints regarding x-ray photographs in cases where these are to be exhibited in court and used as evidence.

The greatest care is required to make the skiagraph competent evidence, and the absolute necessity of using the healthy side of comparison, taking the same exposure from every standpoint, as to time exposed, light and position, must be rigidly adhered to.

Means for identification of the photographs, and care in producing positive assurance of the court that they are *the* exact pictures, and have in no way been changed, are absolute requisites.

Supplementary evidence, in the shape of examination by the fluoroscope as well, as the pictures must be presented and defended on cross examination. Extreme caution is necessary in eliminating sources of error, in the shape of natural or acquired deformities. Caution as to having absolutely *no motion* of the subject on the plate is best obtained by strapping the patient down, or fastening the part to the plate, so that no exaggerated or distorted photograph can result.

Caution is advisable as to allowing the photographer to exhibit or allow the plate, proof, or picture in question to go into any other hands, either from curiosity or from design; also as to reversing the picture or not, by various methods, depending on whether the picture is taken on a plate and printed, or on a paper which is developed as a picture.

Surround the picture with every safeguard to make it competent evidence, not alone to your own mind, but to the court, as courts and judges are sometimes skeptical.

We have never been permitted to place a picture in evidence in this city in a criminal trial, the presiding judge, on one occasion, excluding it on the ground that the picture was not an exact representation, and can not be verified; also that the methods used are not sufficiently established, and the legal status yet under dispute; although I have been allowed to testify in one case as to my examination by the fluoroscope, as additional and supplementary evidence, to a physical examination by me. I especially caution those using the x-ray to take unusual care in giving an opinion of a case without the consent and knowledge of the attending physician, particularly where a suit for malpractice is likely to ensue, or is in the possibilities.

The same precautions should be observed in taking pictures to be used in cases in which suits for damages have been brought against a corporation; or in the so-called "negligence cases," which we so frequently meet; and I al-

*Read before the Medico-Legal Society, June session, 1898, at New York.
Read before the American Association of Physicians and Surgeons, June, 1898, at Chicago.

ways insist on having the consent, and if possible, the actual presence of the attending surgeon, at the time the picture is taken.

If the question of age, or non-union of bone presents, the following points should be considered:

It is well known that adult bones can be readily distinguished from those of children, or where the bones are not fully ossified. Do not mistake an incompletely ossified bone for a fracture, or vice versa.

A picture which I have seen, taken from a mummy in which there was a doubt as to whether the hand was adult and human or not, and was supposed to have been an Egytian prince, (all mummies are), the hand was clearly that of a child, showing the bones not fully ossified.

A case in France was decided against a corporation, on the evidence of a skiagraph, which showed the bones had not been united, although there had been no other evidence than the picture.

This was incorrect, as we know that bony union in fractures takes, in some cases, months or years to unite,—some never completely ossify. This must always be considered. Here the decision was in error, as there were no physical signs of fracture existing. Hence we should never accept, as an assured fact, that we have an ununited fracture or deformity, when other evidences are wanting or are even negative; especially if the patient's subjective symptoms are liable to be biased with the prospect of indemnity. In estimating the amount of damage done, not only must we always compare the injured with the sound side, but remember that some deformities, like those of the wrist-joints, may be quite extensive, and yet perfect co-adaptation of the bony parts have been made,—with perfect union of bone,—yet deformity exists, (particularly true in Colles fracture).

Again, our failure to see the cause of the deformity, in the x-ray, is not evidence that it does not exist, if other symptoms point to its being present. (The contrary line of reasoning in the French case cited).

The reason for this is obvious; the traumata of the soft tissues are often, (particularly in the fractures at the wrists), of greater importance than fractures of the bones.

The x-ray has caused us to look at bones and joints from a very different standpoint than formerly. We must, as competent witnesses, be well versed in the conditions existing, the surgical anatomy of the part, and land marks, aside from, and independent of the additional evidence given by the x-ray.

Fractures and deformities may exist which, from the position, line of fracture, effusion of blood, or character of deformity, will not furnish evidence in a skiagraph or fluoroscope.

Again, failure to get an x-ray, or to get a fluoroscopic view, will, in some cases, occur from faulty manipulations: machinery being out of order, insufficient power, or adverse atmospheric conditions.

Hence failure may occur at one time and success at another.

In one instance where I examined a case for a police surgeon, of gun shot wound, of a prisoner who was supposed to have been shot in the forearm, by an officer of a neighboring city, who escaped the authorities. The man claimed that he was intoxicated at the time of the shooting, and set up also as a defense that the ball was still in his arm.

I was able to demonstrate, clearly and conclusively, before our local and foreign officers, that *no* bullet was in his arm, as the entire arm and forearm were perfectly transparent to the fluoroscope. The ball had been removed, but for reasons best known to the prisoner he refused to reveal when and where, even

when told that we were about to operate and find the ball, supposing that he would weaken in case it was attempted and the ball had already been removed.

Our evidence may, therefore, be of either "to find or not to find" foreign bodies, etc., positive or negative in character, (particularly true in accident insurance cases.)

Counter tests with metals, readily showing in the above, the absolute non-existence of the ball. In this case, it was ascertained subsequently, that it had been removed by a surgeon.

We may be materially assisted in our search for the exact location of foreign bodies, or injuries, by the Dennis fluorometer, which ingenious device gives the exact location for present or future reference.

It is essential in all cases where tissues, other than the arms and legs, are to be examined, particularly in the trunk and the head for bullets, that photographic and fluoroscopic observations should be taken from two or more points of view, at right angles to each other. This is materially aided by the little device mentioned.

While the use of the x-ray is of inestimable value to us in making diagnoses, it is not an unmixed personal good, as we well know from actual experience.

If it increases our diagnostic ability, it also increases our responsibilities, and we are more exposed to suits for malpractice in fractures, particularly if deformity exists, and we have not used it as a means of diagnosis, also in dressing and examination after reduction. I use it in all cases of fracture after splints and bandages are adjusted. Negligence will be claimed for failure to use it in all cases where bad results follow. If we have used this means we are strongly fortified.

Again, the so-called x-ray burn is no small factor, not only in the minds of the laity, but also of the court, and is an actual source of danger, and must always be considered, guarded against, and avoided by proper precautions, by suitable apparatus, not too long exposure, with perfect insulation of the patient, and if necessary, an aluminum or celluloid screen.

I have never seen an x-ray burn where a static machine was used, and believe its dangers to be overestimated; yet it is a factor which we must not ignore. I have made on my own person and others perhaps 2000 exposures, and have not seen a burn of my own making, time being from two minutes to three hours exposure.

Neither can we ignore the possible harm which might result in using it in cases of open wounds or injuries to the brain.

In a case in which I used this method, (the resulting skiagraph was taken after the man's death; three weeks later), the use of the x-ray was used as a defense, on the ground that it seriously jeopardized the man's chances, and that with the use of ether anasthesia, to keep him quiet, was not only seriously condemned by the defense, but the danger was so portrayed, that with the rulings of the court and other circumstances attending the case, the prisoner was acquitted on the charge of a deliberate murder, and our use of the x-ray was a great factor in bringing about this verdict. (I shall have a detailed account of this case at the next meeting of the American Electro-Therapeutical Association, to be held in Buffalo in September next.)

My greatest consolation, in this case, was that the same argument would have been used had I failed to use the x-ray to locate the bullet. Had the case died, then the omission would have been claimed as neglect.

As it was, it was argued that it was a

source of extreme danger to the patient, jeopardizing his chances and leaving a "reasonable doubt" in the minds of the jury, as to whether he might not have recovered had the x-ray not been used. In spite of positive demonstration that no harm resulted from the x-ray or ether,—the man living three weeks after the exposure, and dying of meningitis, which existed at the time the examination made and was due to the presence of a bullet in the brain.

We must, however, not be hampered by prejudice or fear of evil to ourselves, still we must exercise caution, and precaution under all circumstances, particularly in murder trials, criminal and negligence cases of all classes.

What we consider our duty to the case in hand, should be done fearlessly, or there can be no progress in our art; time and science will vindicate us in the end.

Courts and juries deal with tangible things, and evidences which may sway juries may be due to ignorance, bias, or prejudice. We are thus made partly or wholly responsible, allowing the innocent to be punished or the guilty to escape!

Evidences which to our trained surgical senses or deductive logic may be sufficient for us to use as a guide for treatment which holds a human life, may count for naught in a court of law, and our efforts to save life; and best intentions are often looked upon with suspicion by the court and jury. Especially is this true in regard to new discoveries, which are viewed rather in the light of experiments.

Those things which are the best of evidence for us as surgeons, may be the poorest in the world in a legal aspect.

Of this fact we must never lose sight for a moment, and so shape our examinations in this line as to make them conform to the rules of legal evidence in all its technicalities, or our work may not only be productive of no good, but may be an actual source of menace to us personally and professionally.

Careful attention to the points mentioned as to surrounding the case with safeguards will insure you good results in your own cases and make your testimony in courts competent and material evidence.

While the points made in the above will not cover perhaps all conditions which may arise in every case, I am satisfied that the salient factors have been stated.

Elmira, N. Y.

STATIC CURRENTS IN CHRONIC INJURIES. Translated by Frank Ring, A. M., M. D., for the AMERICAN X-RAY JOURNAL.—At the French Society of Electro-therapy, on Oct. 21st, M. C. Sudink, of Buenos Ayres, made a report upon an ingenious application of the currents of high frequency, in a case of luxation of the shoulder.

The injury was caused by a fall. The usual procedures for reduction having failed, the author made several applications of currents of high frequency (one plate upon the deltoid and the other upon the wrist). During one of these applications the head of the humerus was reduced, thanks to the sedative effect, as well as muscular resolution, thus obtained.

This leads the author to formulate the following conclusions: 1st. Currents of high frequency have an indisputable anaesthetic action; 2d. Currents of high frequency have an action upon contractures of traumatic origin.—*Gazette Medicale*, Paris.

RADIOGRAPHY OF FETAL LUNGS.—Atelectasis is readily distinguished in a radiograph of a fetal lung, and can thus be demonstrated in court in doubtful cases. —*Gazz. d. Osp.*, September 4.

LONDON ITEMS.

J. M. BARBOUR, M. B.,
Librarian Roentgen Society, London, Correspondent.

NOTES ON BOOKS.

On the study of the Hand for Indications of Local and General Disease, by Edward Blake, M. D., London. H. J. Glaisher, 1898. (p. p. 45, with illustrations. 2-6.) Dr. Blake has collected within a small compass all that can well be said on the human hand. In terse phraseology he conveys much that the all-round physician would do well to study—and salient points apt to be everlooked by the radiographer. We commend it to those in constant touch with "Hands."—Its value is enhanced by a most complete index and a bibliography.

Radiation, by H. H. F. Hyndman, London. Swan, Sonnenschien & Co., Limited.

This is a successful effort to bring together the results of the more important recent investigations on "radiations" whether of Sound, Light, Heat or Electricity. About 100 pages are devoted to an excellent analysis of the theories of the best workers on Roentgen rays.

Radiations are discussed under different heads and more particularly where the border lands of each branch of physics march together. It is rather a summary of work done up till date, than a practical guide. Prof. Silvanus Thompson in a preface sums up its value thus: —"To the real student of physics who pursues the sucject for its own sake it will be found most useful. It is much too good to be of use to one whose highest aims is to pass examinat ions."

Under the presidency of Dr. Mansell Moullin, the Roentgen Society gave a most successful Conversazione on 21st inst. While there was an absence of any pronounced discovery, a very general improvement was noted in the manufacture and application of the x-ray technique. Among the more prominent exhibitors Dr. Silvanus Thompson showed experiments with the Tesla oscillator, whereby vacuum tubes (destitute of electrodes) gave luminous phenomena within the electrically charged field. Prof. Gladstone showed an apparatus for testing grade of rays, and a h ost of members contributed in many ways to demonstrate to visitors the mysteries of the rays. In side rooms opportunities for purely medical demonstrations were given, and throughout the evening an excellent band contributed to the enjoyment of the guests.

Faivre (Jour de Clin et de Therap Infant,) quotes a case of a child, two and a half years of age, who was supposed to have swallowed a pin. Emetics and purgatives were freely given, but failed to dislodge it. Five weeks after, when the child came under notice, the head was vividly flexed on the left shoulder, and any attempt to move it produced intense pain. Under chloroform anaesthesia a radiograph was taken and the pin was located behind the posterior faucial pillar, from which it was readily removed.

Seiz, (Therapeut, Monakhefts No. 8. 1898) draws attention to errors likely to occur in interpreting injuries to young children. Even in the case of a girl, aged nineteen, who had sustained an outward dislocation of both bones of the forearm,—the radiogram, taken twelve days after reduction—showed the position of the joint to be normal, but with an apparent separation of the tip of the olecranon. However, there was no other clinical sign of this lesion and the *apparent* separation was probably due to the fact that the epiphysis of the olecranon was still joined to the shaft by cartilage. Had the diagnosis been based *absolutely* on the radiogram a fracture of

the olecranon was doubtless been diagnosed.

The foregoing calls to mind the most prominent skiagraphic publication of the year:— Dr. Poland's Tramnatic Separation of the Epiphyses, a work, which, is the most complete of its kind in any language.

Seiz gives a further illustration in which a boy, aged nine, sustained a fracture of the shaft of the femur. It united with an inch of shortening, though the skiagram showed an apparent shortening of three inches! He emphasizes the necessity of recording, in each case, the distance from and the relation to the illumination of the part radiographed.

It is stated that Prof. Roentgen has been offered the Chair of Physics at Leipsic.

THE EDISON PORTABLE CABINET X-RAY OUTFIT.

At the beginning of the Santiago campaign, the necessity of equipping the hospital ships with efficient and powerful x-ray apparatus was immediately perceived by the Surgeon General of the United States Navy, who realized the importance of installing apparatus which should be the most powerful of its kind, and also which should be so simple in construction and operation that it could be properly handled by any ordinary mechanic. An order was, therefore, placed with the Edison Manufacturing Company for one of their latest Portable Cabinet X-Ray Outfits, to be placed on board the U. S. Naval Hospital Ship "Solace" and the entire apparatus was placed in position ready for use forty-eight (48) hours after the placing of the order. A brief description of this apparatus, which is illustrated below, may be of interest to our readers.

The Cabinet which is made of polished quartered oak, of massive construction, occupies a floor space 2 ft. 8 in. by 1 ft. 8 in. and is furnished with four wrought iron Ls screwed on to the base of same, by which it can be rigidly fastened to the deck. This is most necessary, as, in case of heavy weather, the apparatus might be damaged by the ship rolling if it were not firmly attached in this way.

The Edison coil, which is mounted on top of the cabinet is also furnished with brass Ls and strips to hold it firmly in position, and the base of the adjustable focus tube stand is similarly screwed to the top of the cabinet. The upright part of the focus tube stand has a wooden screw at the end of same, by which it is attached to the base, and when the focus tube stand is not required to be used, it is only necessary to unscrew the upright from the base, which can be done in a moment.

The distinctive feature of the Edison electric light x-ray outfits is that there is no vibrator on the induction coil, its place being taken by the instantaneous air-break-wheel device shown in the bottom part of the cabinet.

This device consists of two tooth-wheels mounted on the same shaft. The projections or teeth make contact with two flat brushes, which bear on the outer peripheries, and by which the current is brought in and led out again. These wheels are rotated at a very high speed, by a small direct current motor, which also runs a pressure blower. The air blast from this blower enters a bifurcated tube and is connected to two flat nozzles immediately over the contact brushes.

When the device is set in operation, by starting the motor and connecting the primary of the Edison x-ray coil in series with the binding posts (attached to the break-wheel) provided for this purpose; the spark formed at the contact brushes, when the coil is energized, is instantaneously blown out by the air blast at the moment of formation. This greatly increases the rapidity of change in the magnetic circuit, and consequent-

ly vastly augments the electromotive force in the secondary coil.

The controlling rheostat shown on the upper shelf of the cabinet is used to vary the current in the primary of the Edison coil, and the lever arm of the rheostat is connected to the extension rod passing through the side of the cabinet so that the doors of the cabinet may be closed and the rheostat actuated by means of this extension rod, which is

EDISON PORTABLE CABINET X-RAY OUTFIT.

shown on the right hand side of the cut. The main switch is shown on the left hand side of the cabinet, near the top, and the cut-outs directly underneath same. The advantage of this arrangement is seen at a glance, as the keys of the cabinet are always in the possession of the Chief Surgeon on board ship, and it is impossible for any one to use the apparatus without his permission.

The coil is protected by a polished oak cover (not shown in the cut), which fits over the top of cabinet, and in which, room is left for the fluoroscope to fit into, so that the apparatus is entirely protected when not in use. The operation of the apparatus is exceedingly simple. The focus tube is clamped in the jaws of the focus tube stand and connected to the secondary binding posts of the Edison coil by two highly insulated thin wires.

The doors of the cabinet are now opened and the main switch is turned, which starts the motor and the pressure blower in opreation. The doors of the cabinet are now shut, in order to economize space, and the reversing switch shown on the left of the coil is closed, so that the secondary current from the coil excites the focus tube, and the energy of the coil is increased by gradually drawing out the extension rod attached to the lever of the controlling rheostat.

The patient is now placed in front of the focus tube and the fluoroscope placed behind the limb or that portion of the trunk that it is desired to examine. In cases where the patient is so seriously wounded that it is necessary for him to maintain a reclining position, the focus tube is attached to the portable focus tube holder, as shown in cut No. 2. and the focus tube stand is dispensed with. The end of the portable tube holder wires, which are very highly insulated, are now attached to the secondary binding posts of the coil. These heavily insulated connecting wires are several feet in length and the portable focus tube holder is made of hard rubber so that it can be handled easily, without fear of shock to the operator.

The portable focus tube holder with

focus tube, is now placed underneath the cot or operating table, and the surgeon makes his examination by looking through the patient from above.

The entire apparatus is substantially and strongly made, and is also of handsome design, and the work that has already been done with it has shown the great value of such an apparatus in warfare, and the necessity of equipping all naval, marine and military hospitals with a device of this kind.

One great advantage possessed by this apparatus is that it can be moved from place to place without delay, as the cabinet is mounted on heavy casters, and it is only necessary to disconnect the attachment plug and cord attached to the main switch, from the receptacle into which it may be screwed, and the cabinet may then be moved to any part of the ship or hospital and attached to another receptacle by screwing in the attachment plug, which will not occupy any time whatever.

We understand that the Edison Manufacturing Company have one of these cabinets in operation at their show rooms, St. James Building, Broadway and 26th Street, New York.

Vague and Indefinite Pains Due to Latent Rheumatic Conditions.

The physician is frequently called upon to treat patients, who though not ill enough to be in bed are not at all well. Their appetite is capricious, they sleep indifferently or even if they sleep soundly, they are not refreshed and in the morning they are more fatigued and ill at ease than was the case on retiring. Upon awakening there is frequently an aching sensation in the loins, sometimes in the lower limbs, which is noticed upon getting out of bed or in dressing, and particularly in putting on their hose or lacing their shoes. As the day progresses this soreness may partially wear off, but there is at all times a vague, undefined, uneasy, painful feeling.

A competent examination of the urine in these cases will in almost every instance be found to disclose a notable absence of the soluble urates. On the contrary it may be loaded with the phosphates and very frequently bile will be present as also uric acid. If the condition remains neglected, the probable results will be sooner or later a pronounced attack of rheumatism in one or another of its forms. All that is needed to induce such a condition is a sudden change in the weather or the exposure on the part of the patient to cold or wet or a combination of the two. This is due to a latent rheumatic diathesis, to which every adult is liable.

In such cases the physician will find Tongaline in any one of its forms as indicated, given at short intervals with copious draughts of hot water, a remedy which goes directly to the source of the trouble. Tongaline seeks out the retained excretions or perverted secretions, which it either neutralizes or renders amenable to the physiological action of the emunctories, and then it brings to bear its strong eliminative powers, correcting the complaint promptly and thoroughly.

The Phonendoscope.

This little book, covering about 75 pages, is made up of descriptive matter concerning the practical application of this most useful instrument.

There are 37 beautiful illustrations printed upon half-tone paper, used for the purpose of exemplifying more clearly the work on phonendoscopy. One section of the book contains an article which should be read and studied by every practitioner of medicine. This is chapter 4 on the Relation Between Outlines of the Internal Organs of the Body as Determined by the X-Rays and by

the Phonendsocope. Laws Governing the Two Methods. The same article was published in THE AMERICAN X-RAY JOURNAL, Vol. 2, No. 4. This is a most useful publication. It is not only interesting to read, but very instructive, and will aid the practitioner in a wider range for easy diagnosing. The book is well bound and well printed. Chapters 1, 2 and 3 of this book are of the English translation of lectures by Professor Aurelio Bianchi, translated by A. George Baker, A. M., M. D. The book may be procured in Europe from Martin Wallach, Nachfolger, Gassel, Germany; also from George P. Pilling & Son, Philadelphia. Price 50 cents.